Intellectual ascent

By simple observation of the mediocre behaviour we can notice many characteristics directly opposite to intelligence and wisdom: selfishness, addiction, arguing, violence, greed, vanity, fear, limited vocabulary, semi-literacy, loudness, lack of critical and analytical skills, negative thoughts, etc.

By avoidance of forementioned we make significant step toward our intellectual ascent.

One day we will proudly say: we were humans but we have evolved since.

Human brain anatomy and physiology

Neuron structure

The basic unit of a brain. Neuron is composed of three parts: cell, axon and dendrite.

Cell (soma) is comprised of a nucleus, having DNA inside, and organelles (endoplasmic reticulum, Golgi apparatus, mitochondria, ribosomes, secretory vesicles).

Axon, string like and branching, transmit an electrical signal (action potential) to a presynaptic terminal where it stimulates release of chemical neurotransmitter used for communication with a next cell.

Dendrite is end segment which receive a chemical message from adjacent cell.

Cell`s interior has resting membrane potential of -60mV determined by concentration gradients and membrane permeability.

Sodium has equilibrium potential of +55 mV, Potassium -103 mV (normally, it has positive charge). Usually, cell`s interior has higher concentration of Potassium (K+) while exterior has higher concentration of Sodium and Chloride (Na+ and Cl-).

Membrane more favours Potassium than Sodium causing resting potential to be closer to an equilibrium potential of Potassium.

Action potential is change in cell`s membrane permeability.

Action potential generation has three stages: 1) depolarization from -60 mV to +40 mV caused by Sodium inflow, 2) repolarization caused by Potassium release, 3) in case of hyperpolarization, an equalization.

This task is done by protein mechanism called Sodium-Potassium pump, in 3/2 ratio, using up to 1/3 of ATP (Adenosine Triphosphate).

Signaling pathway restriction such as removal of substance or inactivation of channels, like with neurotoxin poisoning, blocks an action potential manufacture causing numbness, muscle weakness and paralysis resulting in death due to respiratory and heart failure.

Neurocranium

Neurocranium is a bone shield protecting the brain. On the top of a human skull there is a part called calvaria (skullcap).

Neurocranium consists of eight (8) bones: ethmoid, sphenoid, frontal, occipital, two (2) parietal and two (2) temporal. Temporal bones are thinner than rest.

Foramens are openings in a skull serving as passages for nerves and vessels. Largest foramen, Foramen magnum, is situated at the base of a

neurocranium through which spinal cord connects with brain.

Brain stem

Brain stem links spinal cord with cerebrum.

Cerebrospinal fluid

CSF is a clear, colorless liquid produced on daily basis (500ml) in ventricles Choroid plexus by specific type of glial cells called Ependyma. About 125 ml circulates through brain and spinal cord at any given time.

Glands

Hormones are molecules that regulate endocrine functions.

Neurotransmitters are molecules that affect nervous system.

Endorphins are hormones produced by hypothalamus and pituitary gland. There is around 20 different types of which Beta-endorphin is associated with "the runner’s high".

Serotonin is both neurotransmitter and hormone. Large quantity is made by Enterochromaffin cells lined with gastrointestinal tract where it helps food digestion and bowel movement, small amount is made by Pineal gland.

Hypothalamus

Located in the middle of a brain right above brain stem and under thalamus, Hypothalamus coordinates endocrine and autonomic nervous system. It is responsible for keeping stable body state (homeostasis) by releasing specific hormones or stimulating other glands to produce their own.

It directly produces hormones, stored in posterior pituitary, that regulate blood volume and pressure (Vasopressin) and birth process in females, sexual and social conduct in both genders (Oxytocin).

It also directly produces Dopamine (memory, attention, mood) and Somatostatin.

Dopamine is a catecholamine type of neurotransmitter made by hypothalamus. Its synthesis precursor is l-Dopa (levodopa). Supplements that increase dopamine levels are: Tyrosine, L-theanine, vitamins D, B5 and B6, Omega-3 essential fatty acids, Magnesium (Mg).

Natural dopamine production can be stimulated with practically everything you love like your favourite music, dancing, singing, training, mountain hiking, walking through the forest, reading books (learning), social and romantic affiliation(s), etc.

Dopamine plays a key role in the brain’s reward system. It is produced in ventral tegmental area of brainstem and in substantia nigra.

C9H11NO3 l-Tyrosine, synthesized from an essential amino acid phenylalanine C9H11NO2 using an enzyme phenylalanine hydroxylase, is converted into l-DOPA C9H11NO4 , by a rate limiting enzyme tyrosine hydroxylase (TH), which is precursor of Dopamine C8H11NO2 transformed by an enzyme decarboxylase, or DOPA decarboxylase.

Somatostatin controls release of insulin and glucagon and affects digestive system.

It doesn`t produce but stimulates production of Growth hormone (GH), Follicle-stimulating hormone (FSH) and luteinizing hormone (LH), Adrenocorticotropic hormone(ACTH), Thyroid-stimulating hormone (TSH) and Prolactin (PRL) in anterior pituitary.

Pituitary gland (Hypophysis)

Located right under Hypothalamus, pituitary gland (posterior) stores and releases Oxytocin and Vasopressin.

It produces hormones that either directly work or stimulate other glands.

ACTH (corticotrophin) stimulates your adrenal glands to make Cortisol - “stress hormone”.

FSH stimulates hormon production in gonads.

Growth hormone (GH) stimulates growth.

Luteinizing hormone (LH) stimulates hormon production in gonads.

Prolactin stimulates breast milk production.

Thyroid-stimulating hormone (TSH) stimulates thyroid gland.

https://www.ncbi.nlm.nih.gov/books/NBK550972/

Pineal gland

Affected by change in illumination level, Pineal gland produces Melatonin which regulates body's circadian rhythm (day/night shift). It is located behind a brain stem.

described as the “Seat of the Soul” by Renee Descartes and it is located in the center of the brain. The main function of the pineal gland is to receive information about the state of the light-dark cycle from the environment and convey this information by the production and secretion of the hormone melatonin

The pineal gland in humans is a small (100-150 mg), highly vascularized, and a secretory neuroendocrine organ

located in the mid-line of the brain, outside the blood-brain barrier and attached to the roof of the third ventricle by a short stalk. In humans, the pineal gland usually shows a degree of calcification with age

main cell types are pinealocytes (95%) followed by scattered glial cells (astrocytic and phagocytic subtypes) (5). Pinealocytes are responsible for the synthesis and secretion of melatonin.

in cold-blooded vertebrates (lower-vertebrate species), the pineal gland is photosensitive, this property is lost in higher vertebrates. In higher vertebrates, light is sensed by the inner retina (retinal ganglion cells) that send neural signals to the visual areas of the brain

Melatonin (N-acetyl-5-methoxytryptamine) is synthesized within the pinealocytes from tryptophan, mostly occurring during the dark phase of the day, when there is a major increase in the activity of serotonin-N-acetyltransferase (arylalkylamine N-acetyltransferase, AA-NAT), responsible for the transformation of 5-hydroxytryptamine (5HT, serotonin) to N-acetylserotonin (NAS)

N-acetylserotonin is converted to melatonin by acetylserotonin O-methyltransferase.

Gonads

Sex and reproductive glands, stimulated by gonadotropins (FSH, LH) from Pituitary gland, produce female (Estrogens, Progesterone) and male (Testosterone) hormones.

Thyroid gland

Located in neck, it controls metabolism, energy transformation rate, by producing and releasing T4 (Thyroxine), T3 (Triiodothyronine) and rT3 (reversed T3) hormones.

It lowers Calcium level using hormone called Calcitonin.

Parathyroid glands

Calcitonin antagonist, Parathyroid hormone stimulates an increase in Calcium blood level.

Pancreas

Peptide hormones, made by Pancreas alpha and beta cells, Glucagon (catabolic) and Insulin (anabolic), increase or decrease Glucose blood level.

Adrenal glands

Adrenal glands are located on top of both kidneys.

Hormones produced and released by Adrenal glands: Cortisol (stress related),

Aldosterone (blood pressure and pH: electrolytes level - Sodium and Potassium); Catecholamines Adrenaline (Epinephrine) and Noradrenaline (Norepinephrine) which regulate heart rate and vasoconstriction.

Brainstem and taste receptor cells in tongue

Produce small quantities of Serotonin.

Limbic network

Includes several parts of a brain, such as Amygdala and Hippocampus, placed on both sides of a Thalamus region (gray matter cluster).

Amygdala was identified and named by Karl Friedrich Burdach. It is involved in memory processing, decision making and emotional feedback.

Paul Broca related aphasia disorder with specific brain structure named Broca's area.

Hippocampus, first brain region affected in Alzheimer's disease, major cause of dementia, transforms short-term to long-term memory and operates spatial navigation. As a result, common simptoms of Alzheimer's disease include recent events recall loss and disorientation.

Striatum

Largest structure in basal ganglia, critical part of motor and reward systems, receives glutamatergic and dopaminergic instructions.

Glutamate

C5H8NO4

most abundant excitatory neurotransmitter in the vertebrate nervous system

Glutamate is synthesized in the central nervous system from glutamine as part of the glutamate–glutamine cycle by the enzyme glutaminase. This can occur in the presynaptic neuron or in neighboring glial cells.

serves as metabolic precursor for the neurotransmitter GABA, via the action of the enzyme glutamate decarboxylase

AMPA receptors, kainate receptors, NMDA receptors, and metabotropic glutamate receptors.

GABA

γ-Aminobutyric acid (gamma-aminobutyric acid)

C4H9NO2

chief inhibitory neurotransmitter in the developmentally mature mammalian central nervous system. Its principal role is reducing neuronal excitability throughout the nervous system.

GABA receptors

Neurotransmitter receptors

Places in brain where (pseudo)neurotransmitters bind opening or closing ion channels in the postsynaptic membrane producing excitatory or inhibitory effect.

GABA receptors are affected by Alprazolam (Xanax) and reduce neuron excitation.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8803256/

Cannabinoid receptors (G protein–coupled receptors: CB1 and CB2)

The bioavailability of inhaled THC is 10% to 35% and reach peak levels within 6 to 10 minutes.

The bioavailability of ingested THC is only 4% to 12%.

The bioavailability of CBD via inhalation is 11% to 45%, oral CBD is 6%.

The plasma half-life of THC is 1 to 3 days in occasional users and 5 to 13 days in chronic users.

The plasma half-life of CBD is 18 to 32 hours.

An earliest use of cannabis as a medicine is attributed to the Chinese Emperor Shen Nung, who lived around 2700 years B.C. His teachings are written in Pen-ts'ao Ching - book of herbal remedies. William B. O'Shaughnessy introduced C. sativa to West. In 1839., he published a work "On the Preparations of the Indian Hemp or Gunjah" describing cannabis use for muscular spasms, convulsions and rheuma treatment.

Three main species of cannabis plant are C. sativa, C. indica, and C. ruderalis.

Chemical formula is $C_{21}H_{30}O_2$.

CB1 receptors are found in a frontal cortex, hippocampus, basal ganglia, hypothalamus, cerebellum, spinal cord and peripheral nervous system. They

are present in both inhibitory GABA neurons and excitatory glutamat neurons.

CB2 rec. are found on immune system cells, hematopoietic cells and glia cells.

CB1 and CB2 are also widely distributed in the cardiovascular system.

Cannabinoids in the cannabis plant are called phytocannabinoids. Identification of signaling pathways led to a hypothesis that an endogenous cannabinoid system exist in human body (endocannabinoids). A number of endogenous ligands have been discovered.

There is an evidence of decreased endocannabinoid function in various medical disorders like migraine, fibromyalgia, irritable bowel syndrome, multiple sclerosis, diabetic neuropathy, Parkinson disease, etc.

Cannabinoids made in a laboratory to, structurally and/or functionally, mimic endo and phytocannabinoids are called synthetic.

THC is a psychotropic chemical that makes people feel “high”. CBD is nonpsychotropic chemical having medical application in treatment of epilepsy.

Inhalation produces a stronger psychoactive effect than ingestion. Liver enzymes turn THC into 11-OH-THC metabolite, psychoactive, and then into 11-COOH-THC metabolite, not psychoactive.

https://www.ncbi.nlm.nih.gov/books/NBK556103/

Amphetamine is used for treatment of attention deficit - hyperactivity disorder (ADHD) and narcolepsy.

Amphetamine is a central nervous system (CNS) stimulant which molecule has one chiral center existing in a form of two isomers: more potent dextroamphetamine (d-amphetamine) and less potent levoamphetamine (l-amphetamine) salt. Usual medication mixture has 3 to 1 ratio.

Chemical formula is C9H13N.

It increases an amount of dopamine (in much lesser extent noradrenaline and serotonin) binding to Dopamine D2 receptor, affecting Alpha and Beta adrenergic receptors but also blocking an enzyme called monoamine oxidase (MAO) which removes catecholamines from a brain.

It has very similar structure to a catecholamine neurotransmitters and enters presynaptic nerve terminals by associating with two sodium ions and one chloride ion. Then displaces endogenous monoamines.

Amphetamine is metabolized by liver but significant part remains unchanged.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9032145/

Cocaine

Sympathomimetic tropane alkaloid derived from the leaves of Erythroxylon coca, grown in Central and South America. It is found in two forms: cocaine hydrochloride, a white powder, or "crack" cocaine, a free base.

It exerts local anaesthetic action by inhibiting Sodium channels, thus blocking an action potential flow.

Chemical formula for hydrochloride is C17H22ClNO4.

Chemical formula for free base is $C_{17}H_{21}NO_4$.

Psychoactive and sympathomimetic effects of cocaine arise from inhibiting presynaptic transporters responsible for reuptake of dopamine, noradrenaline and serotonin causing an extracellular increase.

Incite release of dopamine.

Stimulation of dopaminergic receptors, Alpha and Beta adrenergic receptors, opioid receptors and Sigma receptors.

Long-term cocaine users have a significant reduction of dopamine receptors D2 and D3 in a striatum.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3028383/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9314805/

5-methoxy-N,N-dimethyltryptamine (5-MeO-DMT)

Tryptamine is metabolite of an essential amino acid - tryptophan which is also a precursor to a neurotransmitter serotonin, a hormone melatonin and vitamin B3. Tryptophan is found in protein rich food like milk, turkey, chicken and eggs.

Tryptamines share their core structure with a neurotransmitter serotonin, 5-hydroxytryptamine (5-HT).

Active metabolite is bufotenine.

Found in venom of Colorado River Bufo alvarius toads and flowering plants bark of Dictyoloma incanescens, Virola snuffs and in Ayahuasca brew, usually leaves of the Psychotria viridis shrub. Stems of Banisteriopsis caapi contain harmala alkaloids like harmine, harmaline and tetrahydroharmine (THH) which act as a monoamine oxidase inhibitor (MAOi) blocking liver and gastrointestinal metabolism of DMT. Syrian rue (Peganum harmala) seeds also act as MAOi.

5-hydroxytryptamine receptor 1A (higher affinity for 5-MeO-DMT)

5-hydroxytryptamine receptor 2A (higher affinity for bufotenine)

5-MeO-DMT can be synthesized in pineal gland and retina (eye). It is found in human body fluids: urine, blood and cerebrospinal liquid.

Chemical formula is C13H18N2O.

serotonin agonist

causes hyperserotonergic effects or serotonin toxicity

lethal syndrome called “staggers” in sheep after grazing on Phalaris tuberose, a plant containing 5-MeO-DMT

acute subjective effects including visual, auditory, and time perception distortions

known to induce intense mystical-type or “peak” experiences as well as feelings of ego dissolution

sense of unity or connectedness accompanied by feelings of reverence, positively valenced feelings such as love or peace, alterations to the sense of both time and space, and difficulty with putting the experience into words

Reports of ego dissolution are often described as a sense of oneness with the universe or the experience of relaxed boundaries between the self and the world

5-MeO-DMT experience contrasts with the DMT experience, as the latter is known to produce particularly vivid and complex visual imagery rather than marked ego dissolution

5-MeO-DMT causes visionary and auditory changes, and distorts the perception of time. The effects start at 3-4 min, peak about 35-40 min

Besides drug-induced discriminative stimulus control, 5-MeO-DMT provokes a variety of other behavioral effects in animal models, such as head shaking, forepaw treading, flat-body posture, straub tail, and hindlimb abduction

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6494066/

LSD

Lysergic acid diethylamide

a natural substance from the parasitic rye fungus Claviceps purpurea

synthesized as Delysid© Sandoz

ego dissolution ("complete loss of subjective self-identity")

typically in the form of a powder or a crystalline material. This solid LSD is then dissolved in a liquid solvent, such as ethanol or distilled water, to create a solution.

It breaks down with exposure to ultraviolet light

LSD is structurally related to substituted tryptamines, or serotonin analogues,

agonist at the 5-HT2A serotonin receptor.

binds to dopamine D1 and D2 receptors

C20H25ON3

as little as 20 µg capable of producing a noticeable effect

Most serotonergic psychedelics are not significantly dopaminergic, and LSD is therefore atypical in this regard. The agonism of the D2 receptor by LSD may contribute to its psychoactive effects in humans

LSD binds to most serotonin receptor subtypes except for the 5-HT3 and 5-HT4 receptors.

agonist on 5-HT1A receptors

has high affinity for other 5-HT1 subtypes 5-HT1B, 5-HT1D, and 5-HT1E

Effects of LSD on 5-HT2C, 5-HT5A, 5-HT6, and 5-HT7 receptors

5-HT2 agonist

5-hydroxytryptamine receptor 2B

hallucinogenic effect of LSD has been linked to its affinity for the 5-HT2 receptor where it acts as a 5-HT2 agonist, as this property is shared by hallucinogens of the phenethylamine group (mescaline, 2,5-dimethoxy-4-iodoamphetamine, etc.) and the indolamine group (psilocybin, DMT)

LSD is probably best called a mixed 5-HT2/5-HT1 receptor partial agonist.

LSD's dual effect on 5-HT2 (stimulatory) and 5-HT1 (inhibitory)

There is also evidence that LSD interacts with dopaminergic systems. In comparison to other hallucinogens, LSD interacts agonistically and antagonistically with central dopamine D1 und D2-receptors

LSD will significantly alter state of consciousness. This alteration is characterized by a stimulation of affect (mostly experienced as euphoria), enhanced capacity for introspection, and altered psychological functioning in the direction of Freudian primary processes, known otherwise as hypnagogic experience and dreams. Especially noteworthy are perceptual changes such

as illusions, pseudohallucinations, synesthesias, and alterations of thinking and time experience. Changes of body-image and ego-function also often occur

“optimum” dosage for a typical fully unfolded LSD reaction is estimated to be in the range of 100–200 µg

Psychomotor functions (coordination and reaction time) are frequently impaired after LSD [33, 34, 35]. LSD also decreases performance on tests of attention and concentration

Typical sensory and psychological effects under the influence of a medium dose of LSD (100–200 µg p.o.)

Sensory alterations (visual, auditory, taste, olfactory, kinaesthetic)

Illusion

Pseudo-hallucination

Intensification of color perception

Metamorphosis-like change in objects and faces

Intense (kaleidoscopic or scenic) visual imagery with transforming

content

Alterations of affectivity

Intensification of emotional experience: euphoria, dysphoria, anxiety,

mood swing

Alterations of thinking

Less abstract and more imaginative thought

Broader and unusual association

Attention span shortened

Alterations of body perceptions

Change in body image

Unusual inner perception of bodily processes

Metamorphic alteration of body contours

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8156539/

Psilocybin

found in Psilocybe mushrooms

C12H17N2O4P

Psilocybin is itself biologically inactive but is quickly converted by the body to psilocin, which has mind-altering effects similar, in some aspects, to those of lysergic acid diethylamide (LSD), mescaline, and dimethyltryptamine (DMT)

psilocybin may be converted from L-tryptophan

psilocin, an agonist for several serotonin receptors with high affinity to 5-HT2A

metabolized mostly in the liver

C12H16N2O

Psilocin has no significant effect on dopamine receptors

acts as a 5-HT2A, 5-HT2C and 5-HT1A agonist or partial agonist

exhibits functional selectivity in that it activates phospholipase A2 instead of activating phospholipase C as the endogenous ligand serotonin does

“mystical-like” hallucinatory effect

Psilocybin’s acute psychedelic effects typically become detectable approximately 30–60 min after low to moderate (2–10 g) dosing

The effects of psilocybin may be classified into four categories: (1)

Perceptual, (2) Cognitive, (3) Emotional and (4) Ego Dissolution

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8902264/

Mescaline

found in Peyote cactus

the North American Lophophora williamsii, also known as Peyote, and the South American Trichocereus pachanoi, also known as San Pedro or “huachuma”

C11H17NO3

dopamine converts into mescaline

Mescaline is a naturally occurring psychoactive phenethylamine

Mescaline, like other classic psychedelic compounds, exerts its pharmacological action primarily at 5-HT1A, 5-HT2A, and alpha-2 adrenergic receptors

primary sensory and cognitive effects result from modulation of serotonergic 5-HT2A receptors

Effective oral dosage of synthetic mescaline is in the 200–400 mg range, with three orders of magnitude greater than the equivalent dose of lysergic acid diethylamide (LSD)

Humphry Osmond was the British psychiatrist who coined the term "psychedelic". in 1955 he administered mescaline to Christopher Mayhew, a member of parliament. Mayhew ingested 400mg of mescaline hydrochloride and recorded his experience on camera.

The footage was originally supposed to be broadcast on BBC.

experience which "took place outside time"

However, an "expert" committee of psychiatrists, philosophers, and theologians reviewed the footage and reached a unanimous verdict that

Mayhew's experience was not a valid mystical experience. So it was never broadcast.

"there is no absolute space and time"

acute mystical-type effects as “moderate,” ego-dissolution and psychological insight effects as “slight,”

Reported visual effects from dried Peyote and synthetic mescaline include spatial distortion, distortion of color, closed-eye visual hallucinations, and synesthesia

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6088236/

DMT

DMT is formed from tryptophan

via the enzyme aromatic L-amino acid decarboxylase (AADC)

extracted DMT from the Mimosa hostilis plant and administered the extract to himself intramuscularly

DMT's formation by brain tissue

presence of DMT in pineal gland

binding affinity of DMT and related hallucinogens for the 5HT2A receptor

DMT has been shown to interact with a variety of ionotropic and metabotropic receptors.

serotonergic and glutaminergic receptors

activation of frontocortical glutamate receptors, secondary to serotonin 5-HT2A receptor-mediated glutamate release

“DMT binds to 5-HT1A, 5-HT1B, 5-HT1D, 5-HT2A, 5-HT2B, 5-HT2C, 5-HT5A, 5-HT6, and 5-HT7 receptors with affinities from 39 nM to 2.1 μM”

DMT-induced head twitch response, a common measure of hallucinogenic

activity

Another set of functionally relevant binding sites for DMT is the family of trace amine-associated receptors (TAARs)

DMT has been shown to be an agonist in binding to TAAR-1 with high affinity, causing activation of adenylyl cyclase and cAMP accumulation in TAAR1 transfected HEK293 cells

sigma-1 receptor

effects of a medium dose (0.7 mg/kg) of DMT, given intramuscularly, were similar to those of mescaline and LSD, including visual illusions and hallucinations, distortion of body image, speech disturbances, mood changes and euphoria

accumulated evidence that DMT was a naturally occurring transmitter in mammalian brain

Perhaps the true “hallucinogen” receptor has already been discovered and is simply mislabeled as being one of the many 5-HT receptors. Perhaps it is their interaction with many receptors and their complex functional connectivity that produces the observed effects

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4773875/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6870240/

Ayahuasca

Ayahuasca is an Amazonian psychoactive brew of two main components

strong serotonergic effects, whereas the sigma-1 receptor (Sig-1R) agonist effect of its active ingredient dimethyltryptamine

also known as natema, hoasca, daime, yagé, or yajé The decoction is prepared by simultaneously boiling two admixture plants, the Banisteriopsis caapi (Malpighiaceae) containing β-carboline type alkaloids such as harmine

and tetrahydroharmine; and most commonly Psychotria viridis (Rubiaceae), which provides the psychoactive alkaloid DMT

other DMT containing plants such as Diplopterys cabrerana (formerly B. rusbyana) of the family Malpighiaceae. The name ayahuasca is a compound word in Quechua language, where aya means soul, ancestors or dead persons and wasca (huasca) means vine or rope

most prevalent translation of the word is “vine of the soul”

the main ingredients of ayahuasca are DMT and the β-carboline derivative alkaloid harmine, harmaline, and tetrahydroharmine

present in mammalian organism; studies have detected it in human blood, brain, cerebrospinal fluid

pineal gland of rats

anxiolytic effects through 5-HT1A receptor agonism

psychedelic effect is connected to its 5-HT2A receptor-activating capacity

Sig-1R action

trace amine associated receptors (supposedly TAAR6)

Sigma receptors were originally misclassified as opioid receptors but later turned out to be non-opioid receptors of their own type

Serotonin stimulation is known to affect the whole organism not just the brain. It causes vegetative changes such as increase in systolic and diastolic blood pressure, pulse rate, provokes nausea, vomiting, and pupil dilation

intravenously injected DMT can cause considerable cardiac stress, it is less burdensome for humans if taken orally

MAO-A inhibition induced by the β-carboline alkaloids presumably results in an increased level of serotonin in the neural pathways, which theoretically can lead to serotonin syndrome in extreme cases

negatively interact with ayahuasca and capable to induce hyperserotonemia include ginseng (Panax ginseng), St John’s-wort (Hypericum perforatum), dextromethorphan, 3,4-methylenedioxy-N-methylamphetamine, SSRIs or MAO inhibitors

single-photon emission computed tomography to reveal the brain areas affected by ayahuasca ingestion. Increased activity was recorded bilaterally in the anterior insula, in the fronto-medial cortical anterior cingulate of the right hemisphere and the left amygdala.

ayahuasca induces a robust activation of occipital, temporal, and frontal areas during a closed-eyes imagery task. The consumption of the brew activated an extended network in the brain (that has previously been correlated to visual perception, memory and intention) in which the Brodmann areas BA10, BA17, BA30, and BA37 play a central role.

significant power increase in the slow gamma (36–44 Hz) band

increased slow- and fast-gamma power (30–50 and 50–100 Hz)

reduced alpha band activation

power decreases in theta and delta bands

other studies found generalized decreases in power across all frequency bands

ayahuasca preparation significantly changed the coupling of brain oscillations between anterior and posterior recording sites in the following pattern. Frontal structures decreased their influence over posterior (central, parietal, and occipital) sites which correlated with the intensity of subjective effects. On the other hand, posterior areas increased their influence over signals measured at anterior locations in parallel with the degree of incapacitation experienced

concept of psychointegrator, where the normal domination of cognition by frontal brain activity is replaced by intense discharges from the lower areas of the brain that are imposed on the frontal cortex

Default Mode Network is usually active in meta-cognition, day-dreaming, reflecting on memories, but is apparently disabled by psychedelics

Psychedelics alter this relaxed brain function by reducing cerebral blood flow and the oscillatory power in brain areas of the Default Mode Network that are typically synchronized and functionally connected. Ayahuasca decreases the functional connectivity within the prefrontal cortex and in connections with other areas of the brain that are involved in a wide range of ordinary cognitive processes

effects of DMT appear to reflect the general effects of tryptamines (e.g., DMT, LSD, bufotenin, psilocin, and psilocybin)

The effects of the harmine alkaloids, however, would be unique to ayahuasca.

After an approximately 35 to 40-min latency period, the consumption of ayahuasca induces an intense modified state of consciousness that lasts approximately 4 h

Perception, spatiotemporal orientation, beliefs about reality and the self, cognitive and emotional processes can all alter significantly during the experience. Visions of beautiful visual scenery are commonly reported together with some typical elements of the “ayahuasca world”: ayahuasca beings, power animals, spirit guides, tropical motifs, vibrant, and varying geometric patterns known from the literature of the cultural anthropology of shamanism.

Ayahuasca experiences are a constant flow of mental contents, during which knowledge is gained by intuition rather than logic. They also show a high level of overall coherence. The level of self-reflection, reminiscence, ethical sensation, prosocial behavior (Frecska, 2008), creative thinking (Frecska et al., 2012), and redemption (de Rios et al., 2002) can be increased or elicited during the experiences. Various psychological blockages and denials may enter awareness and become illuminated from multiple perspectives allowing the participants to gain insight into their maladaptive behavioral, emotional and/or cognitive patterns. These psychodynamic contents are often accompanied by an enhanced internal moral attitude that forces the participants to face their deep thoughts and emotions that confront them with earlier wrongdoings, self-deceptions, and lies

vivid “seeings”

Ayahuasca is served as a tea prepared as a decoction of a bush (Psychotria viridis) and a liana (Banisteriopsis caapi). Psychotria viridis is a rich source of the psychedelic substance N,N-dimethyltryptamine (DMT), whereas Banisteriopsis caapi contains β-carbolines such as harmine, harmaline, and tetrahydroharmine, which are potent monoamine oxidase inhibitors (MAOi). The synergistic interaction of these alkaloids determines the psychotropic action of Ayahuasca

DMT is a serotonergic agonist that acts mainly on 5-HT2A and 5-HT2C receptor

in itself it is not orally active, since it is inactivated by MAO. However, the inhibition of MAO by β-carbolines allows DMT to be psychoactive when ingested. MAOi also contribute directly to the neuropharmacological effects of Ayahuasca by increasing extracellular levels of 5-HT.

The effects of Ayahuasca begin ~ 30–40 min after oral intake, and last up to 4 hours. Autonomic responses include increases in cardiac and respiratory rates, blood pressure, temperature, and pupil diameter [Riba et al., 2003]. Ayahuasca users report many psychological effects, which include changes in self-perception, spatio-temporal scaling [Shanon 2003], and sensory hallucination. Among all perceptual changes induced by Ayahuasca, the most remarkable one are vivid visual hallucinations called mirações (seeings)

very little is known about the neural mechanisms underlying such seeings

from the vision of an animal to a long conversation with somebody unknown

Ten frequent Ayahuasca users participated in the study (mean age: 29 years, from 24 to 48 years, 5 female), after informed consent was obtained from all subjects in accordance with the guidelines approved (No 14672/2006) by the Human Research Committee and the Ethics Committee of the University of Sao Paulo. One subject was excluded from analyses due to uncorrectable amounts of head movement, leaving 9 participants (5 women) in the final dataset.

Each subject drank 120–200 mL of Ayahuasca (2.2 mL/kg of body weight). The Ayahuasca batch used in the experiment contained 0.8 mg/mL of DMT and 0.21 mg/mL of harmine. No harmaline was present in the batch, at the chromatography detection threshold of 0.02 mg/mL.

MR Image Acquisition

All images were acquired in a 1.5T scanner (Siemens, Magneton Vision). The functional dataset was acquired using EPI-BOLD like sequences, and comprises 147 brain volumes with the following parameters: TR = 3,000 ms; TE = 60 ms; flip angle = 90°, FOV = 220 mm; matrix = 128 × 128, slice thickness = 5 mm, and number of slices = 16. High spatial resolution images were obtained from typical Gradient Recalled Echo sequences, constituted of 156 sagital slices, covering both hemispheres, with a 1 mm3 of voxel resolution.

Each subject performed two fMRI sessions. In the first session, subjects were scanned before Ayahuasca intake.

activation of serotonergic receptors

activity in BA17

Ayahuasca had a strong effect in other brain areas related to vision.

nonprimary visual areas strongly modulated by Ayahuasca (BA7, BA18, and BA19) are known to be activated during psychopathological hallucinations as well as during normal dreaming, within rapid-eye-movement (REM) sleep

The activity of cortical areas BA30 and BA37, known to be involved with episodic memory retrieval and the processing of contextual associations

Ayahuasca engages cortical regions necessary for the integration of separate visual elements into a whole scene

This suggests that the seeings induced by the tea are associated with an endogenous engagement of mnemonic circuits, possibly feeding visual areas with the content of the Ayahuasca seeings.

BA10 activity correlates with the amount of intentional effort involved in self-awareness and the imagination of future events

BA10 plays an important role in prospective memory

Ayahuasca intake strongly alters fronto-occipital relationships, producing

marked changes in the temporal ordering of events across several brain regions. In particular, Ayahuasca intake is accompanied by an increased capacity of BA17 to lead other cortical areas during imagery. The functional prevalence and temporal precedence of BA17 during post-Ayahuasca imagery suggest that the seeings caused by Ayahuasca ingestion, robust even with the eyes shut, may in fact be initiated in the primary visual cortex.

our results indicate that these seeings stem from the activation, during voluntary imagery, of an extensive network of occipital, temporal, and frontal cortical areas respectively involved with vision, memory, and intention. By boosting the intensity of recalled images to the same level of natural image, Ayahuasca lends a status of reality to inner experiences.

Brain wavelenghts and frequencies

Human brain works in five (5) frequency ranges (Gamma, Beta, Alpha, Delta, Theta). Significantly distinct to those of television broadcasting and mobile networks which occupy bands measured in MHz and GHz, brain wave frequencies use 0-150 Hz band with brief ripples going up to 200 Hz. Higher oscillations 250–600 Hz occur in epileptic state near brain lesion(s).

Problem could be an electric network (supply grid) frequency that operates nominally at 50-60 Hz. Electric fields arise from electric charges, measured in volts per metre (V/m), while magnetic fields arise from the motion of electric charges, measured in Tesla unit (T) or, less commonly, in Gauss (G). Fields strenght varies from power lines vicinity (several thousand V/m, 20 μT) to home environment (tens of V/m, 0.07-0.11 μT).

microtesla (μT)

Exposure to a direct current electricity (DC) is dangerous above 60 mA for men and 40 mA for women. Perception threshold is 5 mA for men and 3 mA for women. Heart failure occurs at or above 500 mA. For alternating current (AC) values are about 5 times lower.

Ampere, or abbr. Amp, is unit of an electrical strenght (A).

milliamp (mA)

Volt (V) is unit of an electrical potential, equaling A x Ω which means another factor in determing exposure risk is (body) resistance measurable in Ohms (Ω).

Electroencephalogram (EEG) is a method for measuring brain electrical activity.

Electroconvulsive therapy uses 70-450 volts of electricity under general anesthesia.

Deep Brain Stimulation (requires neurosurgery) uses batteries with starting voltage of 3.2-3.72 volts.

Repetitive Transcranial Magnetic Stimulation uses permanent weak electricity (up to 2 mA).

MIT and Vanderbilt University team of neuroscientists recently found that six anatomical layers of cortex show distinct patterns of electrical activity.

Delta waves (0.1-4 Hz) manifest while sleeping. Deeper sleep means lower frequency. Also, they are connected to autonomic nervous system (cardiovascular function, digestion, respiration).

Theta waves (4-8 Hz) indicate tranquillity and are related to a subconscious mind (dreaming, REM phase).

Alpha waves (8-12 Hz) are considered to be link between active and relaxed condition.

Beta waves (12-30 Hz) are presented during normal, daily mental activities. They are increased with stimulants like Caffeine or L-Theanine (Green Tea).

Gamma waves (30+ Hz) accompany high level of thinking such as solving complex tasks, learning and meditating.

Proper feeding (nutrient intake), hydration, resting and active brain usage

1) Your brain needs glucose and electrolytes to operate properly so in addition to eating enough calories to satisfy the basic metabolism you should take care of the sufficient nutrient intake.

2) Good hydration is important for both the crude volume of the blood circulating and for the electrolyte level.

3) Seven (7) to nine (9) hours of sleep each night, with deep phase sleep Rapid Eye movement (REM) all four (4) stages completed, is obligatory! Half (1/2) to one (1) hour of afternoon nap is very contributing. If you work infront of the screen you should rest your eyes every one (1) to two (2) hours for at least 10-15 minutes with your eyelids closed. Otherwise your eye nerves will become irritated and you will much sooner loose your focus actually achieving opposite of the efficiency.

According to study performed by Andrea N. Goldstein and Matthew P. Walker, from Berkeley University Neuroscience Institute, sleep is intimately and causally connected to emotional brain function. Continuous scientific observations show that almost all mood and anxiety disorders can be associated with sleep disturbances, especially with REM phase.

4) Always read, watch, listen and learn new things. Connect, vibrate, sing,

dance, exercise, take new paths during your walking, running, cycling or swimming daily routines or weekly sessions, contemplate, stimulate, meditate.

Circadian rhythm (internal bioclock)

What is (self) consciousness?

Experiment you can do on your own:

Lie in bed. Close your eyes. Concentrate on your brain and mind. Try to move an arm or a leg. Now try to think. You will notice how motoric instructions travel directly from your motor cortex to the peripheral nervous system, initiating immediate voluntary muscular activity, but for thinking to be achieved first your must form words.

Broca's area in the human prefrontal cortex and Wernicke's area in the human temporal lobe are the two most well-known cortical areas involved in the production and comprehension of the speech.

I think Wernicke`s area is related to the audio sensors processing, data collected by our ears, and the speech recognition not the production itself. Broca`s area is solely responsible for the speech production. It is logical. Now I will prove two premises out of their duality: the Broca`s function and the origin of the (self) consciousness. Since we proved with our experiment that in order to think first we must form words isn`t it logical for Broca`s area to be situated right next to the consciousness cortex? Meaning that the subconsciousness isn`t able to initiate thinking because it can not influence the Broca`s area. We never involuntary move our body parts in healthy and aware state. Only our (self) consciousness has direct access to the speech production. Which means that the self-consciousness is situated in the frontal lobe while entire consciousness includes certain regions of the parietal and

temporal lobe, if not all, as well.

Could it be then that the subconsciousness originates in the occipital lobe and includes regions of the parietal and temporal lobe?

The problem of consciousness is arguably the central issue in current theorizing about the mind. Despite the lack of any agreed upon theory of consciousness, there is a widespread, if less than universal, consensus that an adequate account of mind requires a clear understanding of it and its place in nature.

Experiment:

Try to settle your mind. Let no thought be formed as a word.

Empty your mind. Be formless. Beshapeless. (Bruce Lee)

Now focus how your thoughts emerge? Where do they originate? Purely as a chemical reactions? What stimulates that reactions?

Who or what operates us?

"Consciousness is entangled with the human origin story. Today it’s a topic that puzzles scientists and has for as long as we’ve been able to think about it. Why are we conscious? ...Where does consciousness come from?"

"...After decades of mapping the functional parts of the brain the answers have not been found".

"What is consciousness? ...There’s no answer to this question. Definitions of the conscious mind have not been agreed upon".

Hence, the science doesn`t know yet.

I will tell you.

What are consciousness, self - consciousness and sub-consciousness?

Consciousness is an electrical activity of the temporal lobe.

It has power to form words which translate into the thoughts.

Motor commands travel directly.

Hence, do not think about hitting the target - just do it! :-)

Self-consciousness is understanding of our own existence.

Sub-consciousness is an electrical activity of the occipital lobe. It regulates our vital body functions!

Every atom of glucose that enters our brain consist of ... and electron. It has electrical charge. Our brain also has electrical charge with means the two will count as one.

Susan Pockett[1][2] and Johnjoe McFadden[3] have proposed EM field theories

The starting point for McFadden and Pockett's theory is the fact that every time a neuron fires to generate an action potential, and a postsynaptic potential in the next neuron down the line, it also generates a disturbance in the surrounding electromagnetic field. McFadden has proposed that the brain's electromagnetic field creates a representation of the information in the neurons.

The concepts underlying this theory derive from the physicists, Hiroomi Umezawa[14] and Herbert Fröhlich[15] in the 1960s. More recently, their ideas have been elaborated by Mari Jibu and Kunio Yasue.

Water comprises 70% of the brain, and quantum brain dynamics (QBD) proposes that the electric dipoles of the water molecules constitute a quantum field, referred to as the cortical field, with corticons as the quanta of the field.

Thought formation process

Psychological and IQ tests

An intelligence quotient (IQ) is a total score derived from a set of standardised tests or subtests designed to assess human intelligence.[1] The abbreviation "IQ" was coined by the psychologist William Stern for the German term Intelligenzquotient, his term for a scoring method for intelligence tests

The term 'IQ' was coined in 1912 by the psychologist William Stern in relation to the German term Intelligenzquotient. At that time, IQ was represented as

a ratio of mental age to chronological age x 100. So, if an individual of 10 years of age had a mental age of 10, their IQ would be 100. However, if their mental age was greater than their chronological age (e.g., 12 rather than 10), their IQ would be 120.

Two of the most well-known IQ tests are 'Stanford-Binet' and 'Cattell'

qualifying for Mensa in the top 2% means scoring 132 or more in the Stanford-Binet test, or 148 or more in the Cattell

The first group test was created for the US army

Conclusion

Sources:

https://my.clevelandclinic.org/health/body/22638-brain

https://my.clevelandclinic.org/health/articles/22566-hypothalamus

https://my.clevelandclinic.org/health/articles/22581-dopamine

https://my.clevelandclinic.org/health/articles/22618-oxytocin

https://my.clevelandclinic.org/health/body/21459-pituitary-gland

https://anatomy.co.uk/pineal-gland/

https://www.hopkinsmedicine.org/health/conditions-and-diseases/anatomy-of-the-brain

https://www.sciencedirect.com/topics/neuroscience/brocas-area

https://plato.stanford.edu/entries/consciousness/

https://dictionary.apa.org/consciousness

https://humanoriginproject.com/quantum-mind-explains-origin-consciousness/

https://www.hopkinsmedicine.org/health/conditions-and-diseases/adrenal-glands

https://www.healthline.com/health/mental-health/serotonin

https://my.clevelandclinic.org/health/body/23040-endorphins

https://openbooks.lib.msu.edu/neuroscience/chapter/the-neuron/

https://www.mensa.org/iq/what-iq

https://www.nature.com/articles/s41598-020-80548-y

https://www.visiblebody.com/blog/facts-about-skull-anatomy